

Evaluation of using pediatric emergency rooms

 Yakup Cag,¹  Mustafa Ozcetin,²  Abdurrahman Avar Ozdemir,³  Hanim Elveren⁴

¹Department of Pediatrics, University of Health Sciences, Dr. Lutfi Kirdar Kartal Training and Research Hospital, Istanbul, Turkey

²Department of Pediatrics, Istanbul University Istanbul Faculty of Medicine, Istanbul, Turkey

³Department of Pediatrics, Biruni University Istanbul Medicine Hospital, Istanbul, Turkey

⁴Association of Istanbul Anatolia South Public Hospitals General Secretary, Istanbul, Turkey

ABSTRACT

OBJECTIVE: The overload of pediatric emergency units around the world became an increasingly growing problem for patients and health care professionals. Researching the features of use of pediatric emergency services will provide information for creating an effective emergency medical system, increasing patient satisfaction and reducing the costs. In this study; we aimed to evaluate the admissions to pediatric emergency rooms, the effectiveness of service in emergency rooms and develop suitable strategies to increase the amount and quality of medical service given in pediatric emergency rooms.

METHODS: In the study, 296,858 (51.2% female, 48.8% male) patient admissions to the emergency rooms and 384,171 (46.3% female, 53.7% male) admissions to the outpatient clinics of same eight hospitals two of which were research and training hospitals between January 2015 and June 2015 have been retrospectively scanned.

RESULTS: The average age of patients who admitted to the emergency room was 89.1 (± 21.3) months while it was 87.2 (± 18.7) months in patients who admitted to the outpatient clinics. Upper respiratory tract infection was the most frequent (44.23%) diagnosis in emergency rooms and most of these (63.67%) patients admitted to the two training and research hospitals that provide advanced level health care. Also, the request for diagnostic purpose was determined significantly high in emergency rooms.

CONCLUSION: The proper use of emergency services is very important in order to provide fast and effective healthcare to the real emergencies who admit to the emergency rooms and maintain appropriate use of the resources of emergency rooms.

Keywords: Non-urgent; overcrowding; pediatric emergency.

Cite this article as: Cag Y., Ozcetin M., Ozdemir A. A., Elveren H. Evaluation of using pediatric emergency rooms. North Clin Istanbul

The emergency rooms (ER) and outpatient clinics (OC) of the hospitals are the areas where the health problems of people are diagnosed and treated promptly. These areas are accepted as the showcase of the hospitals and are the windows of the hospitals that are accessible by the public [1]. The main goal in building a health service system is to categorize patients as emergency and non-emergency and refer them accordingly either to the ER or to the OC. In a study conducted in the USA, it was shown that the access of the individuals who do not

have health insurance to health care services augmented after the individuals were included in the scope of health insurance. This approach also decreased the rates of ER admissions significantly [2]. However, the expectation about decreasing the rate of ER admissions did not actualize despite easier access to the health care services compared to former years in Turkey [3, 4].

Generally the numbers of ER admissions are always higher than the number of OC admissions. Also, 25-50% of hospitalized patients admit to the ER initially.

Received: January 13, 2018 *Accepted:* March 18, 2018 *Online:* August 27, 2018

Correspondence: Dr. Mustafa OZCETIN. Istanbul Universitesi Istanbul Tip Fakultesi, Cocuk Sagligi ve Hastaliklari Anabilim Dalı, Istanbul, Turkey.

Tel: +90 532 724 89 39 e-mail: mozcetin@gmail.com

© Copyright 2018 by Istanbul Provincial Directorate of Health - Available online at www.northclinist.com



Today, the overload of the emergency services in many countries of the world is a very well-known and proven problem. The overload of emergency service causes fatigue and stress in health care professionals and dissatisfaction of patients. It also decreases the quality of the service provided [5]. American College of Emergency Physicians (ACEP) described the overcrowding of ERs as “the inability of the current emergency facilities to fulfil the basic needs of patients who admit to the ER” in 2002. The reasons that contribute to the overcrowding in ER are different in adult and pediatric ERs. Admissions to pediatric ERs very rarely result in hospitalization [6, 7]. The most important reason contributing the overload in pediatric ERs is the excessive number of patient admissions. The most important result of the overload is prolonged waiting period and duration of stay in the ER. This situation contributes also to the increasing of the costs. A former study from the USA showed that the costs of emergency rooms could be as high as four times than the outpatient clinics [4, 8]. Preventing misoccupying of the pediatric ERs will increase the quality of services and satisfaction of patients and it will contribute to decrease the costs. The aim of this study is to determine whether or not the pediatric ERs and OCs are giving the suitable services compatible with their purposes and contributing to the determination of suitable strategies for these facts.

MATERIALS AND METHODS

A retrospective review of medical records of the 8 hospitals that are connected to the province of Istanbul between January 2015 and June 2015 was performed. Clinical and

demographic data were retrospectively collected from the patients’ medical records. This study was approved by local institutional review board (No: 35278018-770) and an informed consent was obtained from local government authorities. Patients between one month and 16 ages were included in the study. Demographic variables of the patients, diagnostic tests that were applied to the patients, the diagnoses and follow-up results of the patients who admitted to the ER and OC were examined and compared. The diagnoses were categorized according to International Classification of Diseases-10 (ICD-10) diagnosis coding system. Admissions have been classified as; Upper respiratory tract infections (URTI) (rhinitis, sinusitis, pharyngitis, otitis, laryngitis, laryngotracheitis), trauma and burns (various injuries originating from accidents, falls from heights, physical assault and exposure to heat, radiation, electricity or chemicals in the dermic and hypodermic tissue), general physical examination without any pathologic findings and diagnoses, gastrointestinal system diseases (gastro esophageal reflux, gastritis, gastroenteritis, constipation, intussusception, appendicitis, perforation and intestinal obstruction), non-specific pain symptoms (headache, abdominal pain, chest pain or extremity pain in which an etiological factor has not been determined), lower respiratory tract diseases (acute bronchiolitis, pneumonias, bronchiectasis, asthma, obstructive or restrictive lung diseases), urinary system diseases (urinary tract infections, urolithiasis, glomerular diseases), skin and dermal diseases (urticaria, erythema, dermatitis, eczema, bullous lesions), non-specific fever (fever in which an etiological factor has not been determined), ocular diseases (conjunctivitis, blepharitis, ocular extraneous body), hematologic diseases (anemias, co-

TABLE 1. The distribution of the cases admitted to emergency room and outpatient clinics according to age and gender groups

Ages (months)	Emergency room n (%)				Outpatient clinics n (%)			
	Female		Male		Female		Male	
	n	%	n	%	n	%	n	%
1–12	2199	0.74	1946	0.66	7151	1.86	9145	2.38
12–24	15837	5.34	15524	5.23	18346	4.78	23128	6.02
24–60	35937	12.11	35291	11.88	34478	8.98	45535	11.85
60–144	59620	20.08	54475	18.35	71513	18.62	81652	21.25
>144	38443	12.95	37666	12.69	46274	12.06	46949	12.22
Total	151956	51.19	144902	48.81	177762	46.27	206409	53.73

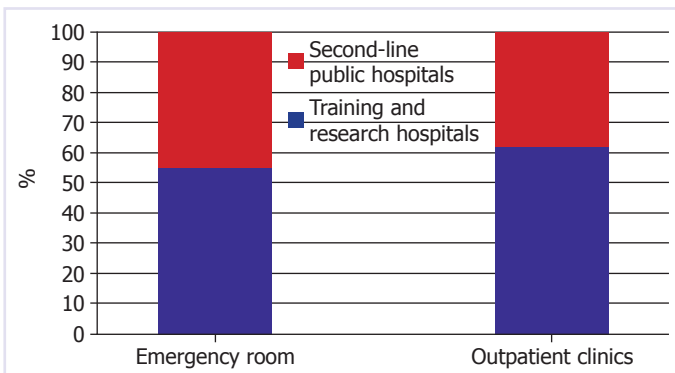


FIGURE 1. Distributions of patients to the hospitals.

agulation disorders, immunodeficiency), nervous system diseases (meningitis, encephalitis, neuropathy, convulsions, muscle diseases, cerebrovascular events).

SPSS (Statistical Package for Social Sciences) for Windows 15.0 program was used in research for statistical analysis and the value of $p < 0.05$ was considered significant.

RESULTS

Two of the eight hospitals included in the study were training and research hospitals and six of them were second-line public hospitals. 296,858 (51.19% female, 48.81% male) patients admitted to the ER (Group 1) and 384,171 (46.27% female, 53.73% male) patients admitted to the OC (Group 2) during the above mentioned time period. 269,852 (90.90%) of total patients who admitted to the ER were categorized in terms of diagnosis groups. 27,006 (9.10%) of them were categorized under other (patients who had very rare diseases which could not be further grouped in diagnosis groups 48,966 (12.75%) of the patients who admitted to the OC were

also grouped as other. The average ages of patients included in the study was 89.1 (± 21.3) months in patients admitted to the ER while it was 87.2 (± 18.7) months in patients admitted to the OC. The categorization of diagnosis groups in Group 1 and Group 2 are shown in Table 1. Female admissions to ER and male admissions to the OC was found significantly high ($p < 0.05$). 55.14% of admissions to ER and 61.74% of admissions to OC were detected in training and research hospitals (Figure 1). In Group 1, (URTI) (44.22%) and trauma (14.48%) were the most common diagnoses (Figure 2) ($p < 0.05$). The relations of patients with diagnosis and age groups are seen in Table 2. 63.67% of URTI patients admitted to the ERs of training and research hospitals (Table 3). In Group 2 URTI (22.41%) and general physical examination (21.67%) were the most common diagnoses (Figure 3) ($p < 0.05$) (Table 4). Further diagnostic tests were required for 49.43% (146,745) of 296,858 ER admissions and for 42.03% (161,469) of 384,171 OC admissions. It was determined that more tests were required for ER admissions than for OC admissions and this difference was statistically significant ($p < 0.05$) (Figure 4).

DISCUSSION

This study showed that the most common reason for pediatric ER admissions in Istanbul was for URTI. URTI was also the most common reason for OC admissions. Although not statistically significant, both ER and OC admissions preferred the two training and research hospitals when compared to the other six general state hospitals.

In a comprehensive study in the USA, the average age of the children who admitted to the hospitals was determined as 6.9 years and it was reported that more than half of all applications were the children between 0–4

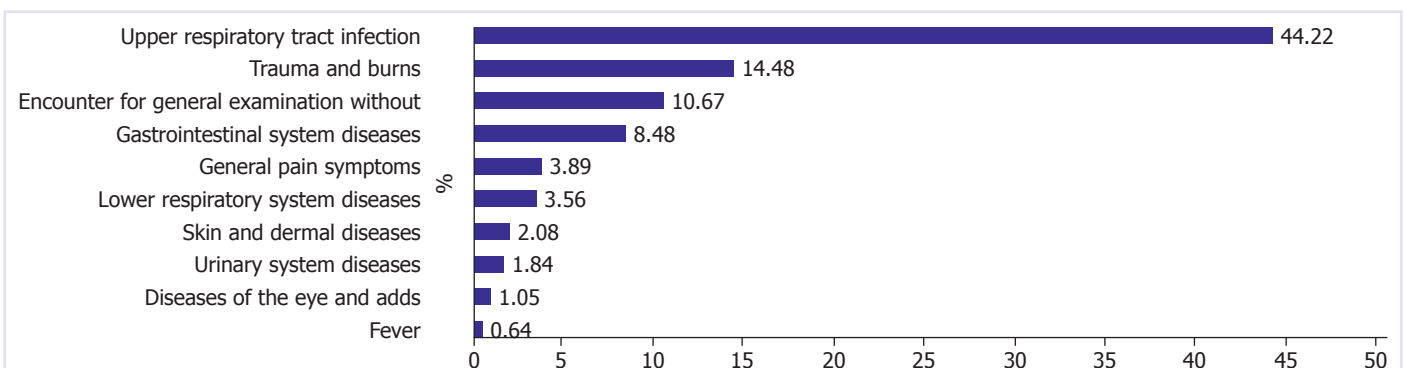


FIGURE 2. The prevalent diagnoses in the emergency room.

TABLE 2. The age distribution of the children according to the prevalent diagnoses in the emergency room

	Age (months)										Total	
	1-12		12-24		24-60		60-144		>144			
	n	%	n	%	n	%	n	%	n	%	n	%
Upper respiratory tract infections	1427	1.09	13559	10.33	32079	24.44	52092	39.68	32108	24.46	131265	100
Trauma and burns	655	1.52	4162	9.68	9582	22.30	17264	40.18	11308	26.32	42971	100
General physical examination without complaint	446	1.41	2686	8.48	8705	27.47	11338	35.78	8514	26.87	31689	100
Gastrointestinal system diseases	338	1.34	2894	11.50	5827	23.16	9812	38.99	6294	25.01	25165	100
General pain symptoms	142	1.23	1240	10.73	2734	23.65	4332	37.47	3112	26.92	11560	100
Lower respiratory systems diseases	108	1.02	965	9.13	2438	23.07	4152	39.29	2905	27.49	10568	100
Skin and dermal diseases	76	1.23	770	12.48	1338	21.69	2422	39.26	1563	25.34	6169	100
Urinary system diseases	65	1.19	640	11.72	1173	21.49	2247	41.16	1334	24.44	5459	100
Ocular diseases	48	1.55	432	13.92	755	24.32	1220	39.30	649	20.91	3104	100
Fever	16	0.84	156	8.20	478	25.13	710	37.33	542	28.50	1902	100

TABLE 3. Distribution of the most frequent diagnoses to the hospitals

	Training and research hospitals		Second-line public hospitals		Total
	n	%	n	%	n
Upper respiratory tract infections	83578	63.67	47687	36.33	131265
Trauma and burns	19526	45.44	23445	54.56	42971
General physical examination without complaint	10600	33.45	21089	66.55	31689
Gastrointestinal system diseases	15094	59.98	10071	40.02	25165
General pain symptoms	6957	60.18	4603	39.82	11560

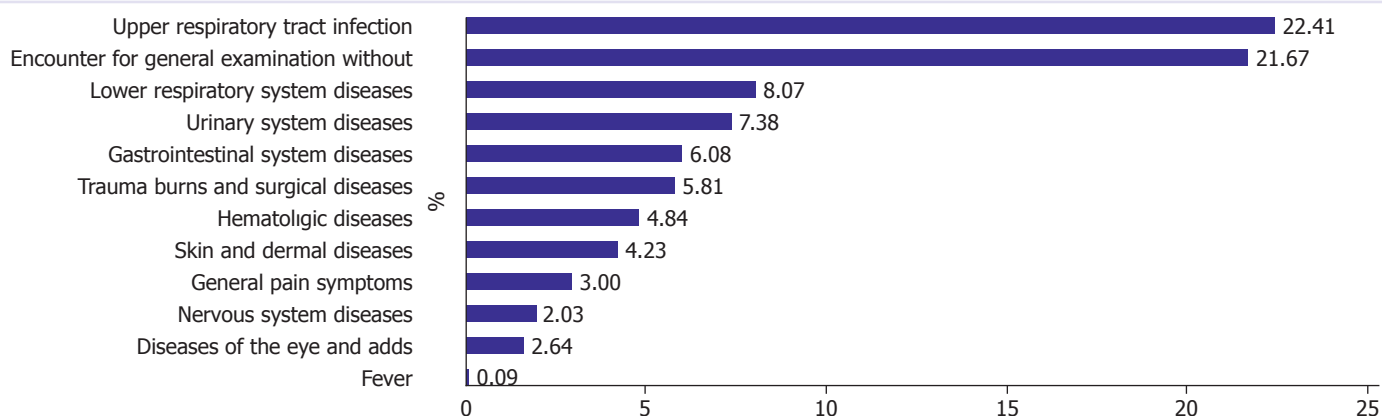
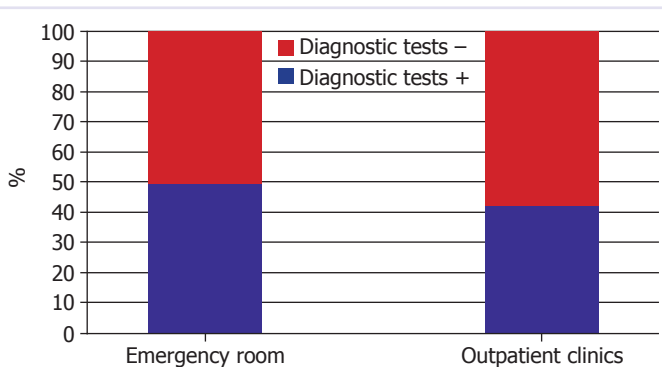
**FIGURE 3.** The prevalent diagnoses in the outpatient clinics.

TABLE 4. The age distribution of the children according to the prevalent diagnoses in the outpatient clinics

	Age (months)										Total	
	1–12		12–24		24–60		60–144		>144			
	n	%	n	%	n	%	n	%	n	%	n	%
Upper respiratory tract infections	2840	3.30	9274	10.77	21645	25.15	39025	45.34	13294	15.44	86078	100
General physical examination without complaint	4590	5.51	8584	10.31	15280	18.35	33243	39.93	21553	25.89	83250	100
Lower respiratory systems diseases	1280	4.13	4748	15.32	8453	27.28	12395	40.00	4110	13.26	30986	100
Urinary system diseases	580	2.05	2684	9.47	5066	17.88	14046	49.57	5960	21.03	28336	100
Gastrointestinal system diseases	1254	5.37	3088	13.22	5539	23.71	8957	38.34	4526	19.37	23364	100
Trauma burns and surgical diseases	467	2.09	2635	11.80	5051	22.61	7102	31.79	7082	31.71	22337	100
Hematologic diseases	642	3.45	2864	15.39	4286	23.04	6836	36.74	3978	21.28	18606	100
Skin and dermal diseases	1072	6.59	2258	13.89	3157	19.41	5024	30.89	4751	29.22	16262	100
General pain symptoms	232	2.01	435	3.77	1085	9.40	3784	32.79	6004	52.03	11540	100
Nervous system diseases	88	1.13	799	10.26	1873	24.05	2728	35.02	2301	29.54	7789	100
Ocular diseases	940	14.93	1029	16.34	982	15.59	2102	33.38	1245	19.77	6298	100
Fever	36	10.03	89	24.79	110	30.64	98	27.30	26	7.24	359	100

**FIGURE 4.** The rates of diagnostic tests required from patients admitted to emergency rooms and outpatient clinics.

years [9]. Compatible with this literature, the average age of admissions in both Group 1 and 2 in our study was found 7 years. In different studies, the rate of younger age groups was found high [10, 11]. In our study, the application rate of the children under five years of age to ERs was found as 35.96%. Only 11.97% of patients admitted to ERs were under two years of age. At the same time, the age distribution of patients in OCs was also found similar to that in ERs. Age distribution may be explained with the school attendance age of children. Certainly, a school child will be exposed to more agents than a child at home.

When we evaluated patients according to their diagnosis, we detected that many diseases that could be solved in OCs and primary healthcare services were tried to be treated in emergency services. Patients prefer the emergency services instead of being examined by the doctors with appointment system because of the easy and fast access to ERs and many problems that could be solved in primary healthcare services are taken to ERs. While we look at the diagnosis of ER admissions, the diagnosis of URTI (%44.22) and trauma (%14.48) were the most determined ones. We determined that most of patients got the diagnosis of URTI in emergency services were in tertiary hospitals. In 2005, 65% of patients applied to emergency services were composed of non-urgent cases and this rate reached to 70% today [12]. Even this finding is enough to think about new strategies for ER admissions. In recent studies URTI and trauma were the most frequent diagnosis in ERs [9, 13]. In a study carried out in the USA, it was reported that the respiratory tract infections were seen mostly in little children while injuries were seen mostly in older children [9]. In our study, URTI diagnosed in ERs was in the first place for all groups and URTI diagnosis was more common in ERs than in OCs. The most common diagnosis groups in the OCs were URTI and general examination including complaints of Mongolian spot, teething, physiolog-

ical developmental behaviors and non-specific controls. While general examination as one of the most common diagnoses in OC is an acceptable fact, it is a problem itself to be one of the most common diagnoses in the ER.

Appropriate medical care in ERs in terms of cost and effectiveness is also important. The costs of patients admitting to ERs are much more than the costs of patients admitting to OCs [8]. Determining the diagnostic tests in our study, we found that the investigations were required 49.43% of ER admissions and 42.03% of OC admissions. This may be because of the insufficiency of number of the specialized health staff working in ERs or because of the tendency of the physicians to spare more time for examining more patients. One of the most important proven reasons of overload in ERs is the unnecessarily prolonged patient stay in the ER [14]. Diagnostic tests and waiting for results also cause prolonged patients stay in ER. All additional diagnostic tests also increase treatment costs.

Qualified and functional health services will help providing healthy individuals. Although the level of quality of health services change from country to the country, the main target is to protect the health of the individuals. In recent years, it is easier for people to access health services as a result of the increasing demand for quality health services and changing health policies. As a result of these policies it is easier for the individuals to reach the health facilities before having an emergency. Thus lower rates of ER admissions are expected. Our study has demonstrated that despite all new approaches and new policies, individuals still prefer ER admissions for even non-emergencies. The reasons underlying this condition should be evaluated meticulously in order to prevent this attitude.

Including ours, in many countries the only unit that can give health care services to children out of the working hours is pediatric emergency service therefore on some conditions (weekends, holidays, after 5 pm etc.) patients have to admit to the ER to get healthcare. Also, inadequate number of pediatric ERs, inadequate number of beds in hospitals or decreasing the number of beds for directory reasons and inadequacy of the numbers of trained and experienced staff as physicians and nurses who could give emergency health care services are among the other important reasons [15]. At the same time, over caring parents are another factor for the overload of pediatric ER. Former studies have shown that, the mothers tend to consider their children to have more serious diseases than their current situations [16].

Occupying the emergency services for non-emergency cases is a big problem in many countries as well as ours [17, 18]. There are various suggestions and applications in ERs for effective care and a better workflow. The most common ones are five-step triage system, emergency care applications that are started by the nurse at the first admission, fast maintenance and grouping of patients and providing more trained and more tolerant staff with improved clinical applications [19]. Additionally some public spots that explain the public when they should apply to ERs and where and when they should get the health-care services appropriately can be telecasted.

The over load of ERs can be decreased by strengthening the primary health care services and taking the referring chain into agenda again or organizing OCs on duty out of working hours for a certain time period.

In conclusion, the proper use of ER can be summarized as the appropriate patient, at the appropriate health care facility, at the appropriate time. By this way, the real emergency patients admitting the ERs get the medical care faster and more effectively and the sources of ER can be used properly. This problem cannot be solved personally but definitely needs proper intervention and organizing of health care systems in any countries.

Acknowledgements: We thank clinical research development Istanbul Anatolian South Public Hospitals Association for access to medical records and editing this article.

Conflict of Interest: The authors declare no conflict of interest.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Schneider SM, Gallery ME, Schafermeyer R, Zwemer FL. Emergency department crowding: a point in time. *Ann Emerg Med* 2003; 42: 167-172.
2. McWilliams JM, Meara E, Zaslavsky AM, Ayanian JZ. Use of health services by previously uninsured medicare beneficiaries. *N Engl J Med* 2007; 357: 143-153.
3. Mahsanlar Y, Parlak İ, Yolcu S, Akay S, Demirtaş Y, Eryiğit V. Factors Affecting the Length of Stay of Patients in Emergency Department Observation Units at Teaching and Research Hospitals in Turkey. *Turk J Emerg Med* 2014; 14: 3-8.
4. Galarraga JE, Pines JM. Costs of ED episodes of care in the United States. *Am J Emerg Med* 2016; 34: 357-365.
5. Guttman A, Schull MJ, Vermeulen MJ, Stukel TA. Association between waiting times and short term mortality and hospital admission after departure from emergency department: population based cohort study from Ontario, Canada. *BMJ* 2011; 342: d2983.
6. Stang AS, McGillivray D, Bhatt M, Colacone A, Soucy N, Léger R, et al. Markers of overcrowding in a pediatric emergency department. *Acad*

- Emerg Med 2010; 17: 151-156.
7. Doan Q, Genuis ED, Yu A. Trends in use in a Canadian pediatric emergency department. *CJEM* 2014; 16: 405-410.
 8. Cremonesi P, Di Bella E, Montefiori M. Cost analysis of emergency department. *J PrevMedHyg* 2010; 51: 157-163.
 9. Merrill CT, Owens PL, Stocks C. Pediatric Emergency Department Visits in Community Hospitals from Selected States, 2005. *HCUP Statistical Brief #52*. May 2008. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/reports/stat-briefs/sb52.pdf>
 10. Derinöz O, Tunaoğlu FS. Usage of pediatric emergency department observation unit for children: observations in a university hospital. *Türk Pediatri Ars* 2007; 42: 61-64.
 11. Pileggi C, Raffaele G, Angelillo IF. Paediatric utilization of an emergency department in Italy. *Eur J PublicHealth*. 2006; 16: 565-569.
 12. Erenler AK, Akbulut S, Güzel M, Çetinkaya H, Karaca A, Türkoz B, et al. Reasons for Overcrowding in the Emergency Department: Experiences and Suggestions of an Education and Research Hospital. *Türk J Emerg Med* 2016; 14: 59-63.
 13. Boran P, Tokuç G, Büyükkalfa DÇ, Taşkın B, Pişgin B. Evaluation of the Patients Admitted to the Pediatric Emergency Department. *J Child* 2008; 8: 114-116.
 14. Singer AJ, Thode Jr. HC, Viccellio P, Pines JM. The Association Between Length of Emergency Department Boarding and Mortality. *Acad Emerg Med* 2011; 18: 1324-1329.
 15. Hostetler MA, Mace S, Brown K, Finkler J, Hernandez D, Krug SE, et al. Emergency department overcrowding and children. *Ped Emerg Care* 2007; 23: 507-515.
 16. Doobinin KA, Heidt-Davis PE, Gross TK, Isaacman DJ. Nonurgent pediatric emergency department visits: care-seeking behavior and parental knowledge of insurance. *Pediatr Emerg Care* 2003; 19: 10-14.
 17. Harris L, Bombin M, Chi F, DeBortoli T, Long J. Use of the emergency room in Elliot Lake. a rural community of Northern Ontario, Canada. *Rural Remote Health (Internet)* 2004; 4: 240.
 18. Bektemür G, Osmanbeyoğlu N, Cander B. Emergency Department Care Survey. *Eurasian J Emerg Med* 2015; 14(sup):1-33.
 19. Barata I, Brown KM, Fitzmaurice L, Griffin ES, Snow SK. Best Practices for Improving Flow and Care of Pediatric Patients in the Emergency Department. *Pediatrics* 2015; 135: e273-283.